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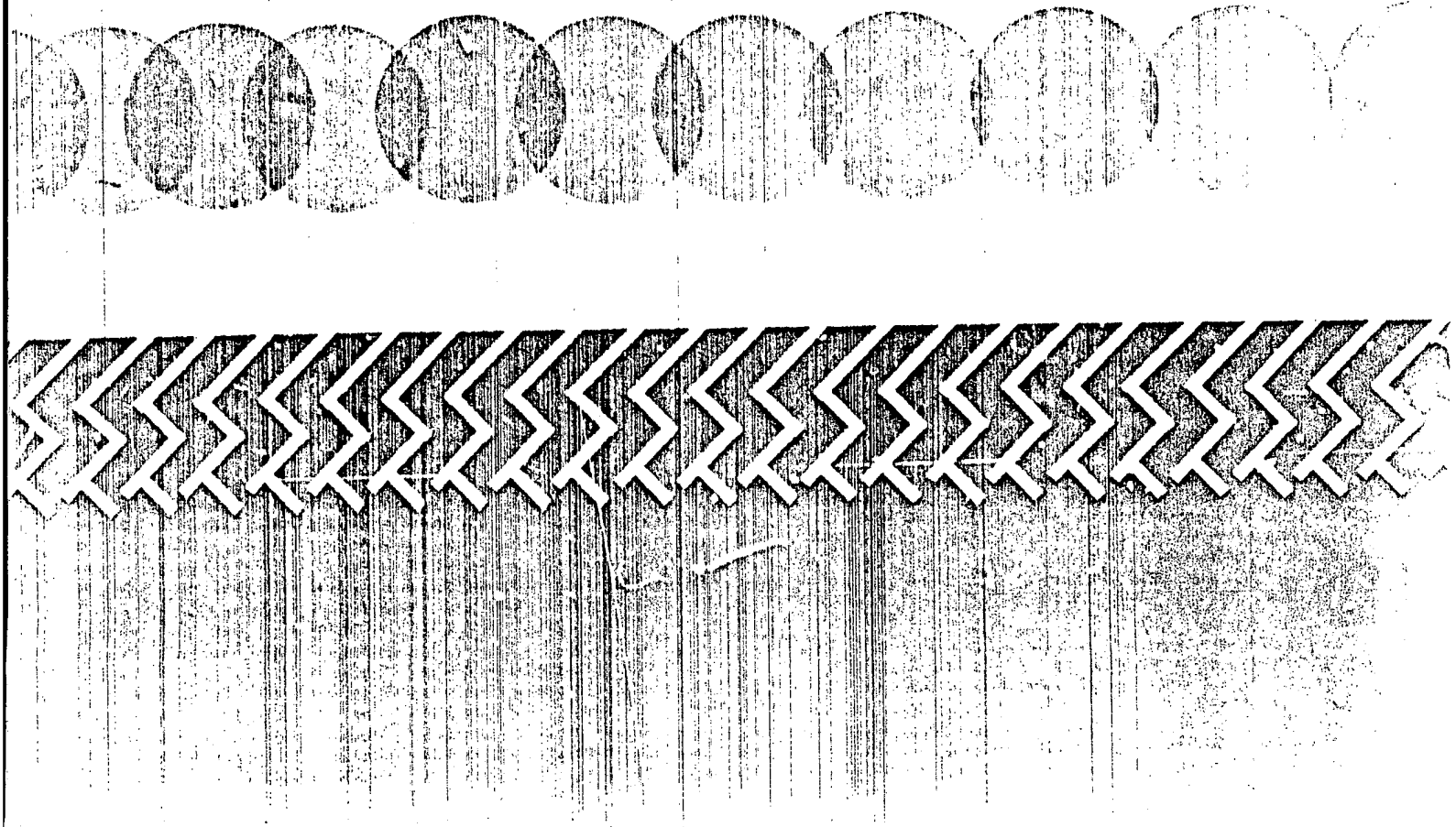
DETECTION AND ANALYSIS OF 1974 DROUGHT IN CENTRAL USSR



NATIONAL SECURITY INFORMATION
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DETECTION AND ANALYSIS OF 1974 DROUGHT IN CENTRAL USSR

INTRODUCTION

1. The total USSR grain production for 1974 probably has been substantially reduced by a stress condition which affected the spring wheat crop in western Siberia and northern Kazakhstan. [redacted] detected this stress condition and potential yield reduction at the end of May and followed the development of this condition through the remainder of the growing season. An examination of the development of the problem and its detection and delineation should illustrate [redacted] methodology and provide a basis for the future analysis of similar situations.

THE AREA AND CROP

2. The drought area stretched from Aktyubinsk to Krasnoyarsk, with Vostochno-Kazakhstan, Semipalatinsk, Pavlodar, Altay, and Krasnoyarsk most severely affected (Figure 1). The prinicipal crop in this area is spring wheat. The latitude, soils, and climate in much of the area are analogous to those of the prairie provinces of Canada.

DETECTION

3. The first indication of a stress problem in the drought area was obtained from a computer-assisted Agromet model. This model calculates daily plant stress based on moisture availability and the growth stage of the crop. For example, moisture stress at heading time is much more detrimental to crop yield than the same amount of stress just after emergence. The model displayed a potential for significant yield reduction in the area by the end of May (Figure 2). By mid-July, stress had accumulated to a degree that, at best, a substantial yield reduction had occurred and there was a strong possibility that the crop was lost. Rains in the area during late July and early August could not appreciably improve the yield of the crop.

4. The potential drought condition was also indicated by collateral as early as the end of May but was not detected until early July, when reports became more specific. The computerized collateral file has been completed and will enable faster and more extensive analysis of the data, which should make collateral indications of agricultural problems detectable at an earlier date.

DELINEATION

5. Early May imagery indicated a normal situation in most of the drought area. Imagery at the end of May, which was received and analyzed at the end of June, displayed a drought condition. The analysis of subsequent photography reinforced this conclusion. End-of-July [redacted] imagery analyzed the first week in August provided additional confirming evidence (photo B, Figure 3). ERTS imagery of 2 June received in mid-July enabled a better delineation of the affected area.

6. All three elements — the Agromet model, collateral, and imagery — provided predictive information on the drought. The model provided indications of a potential situation about one month before the other elements. However, in retrospect the collateral data provided subtle indications about as early as the Agromet model. By mid-July the *convergence of evidence* clearly displayed the problem. The [redacted] approach to estimate spring wheat production detected a potential problem at the end of May and confirmed and quantified the problem by mid-July, which enabled an adjustment, in a usable time frame, in the estimate of total production.

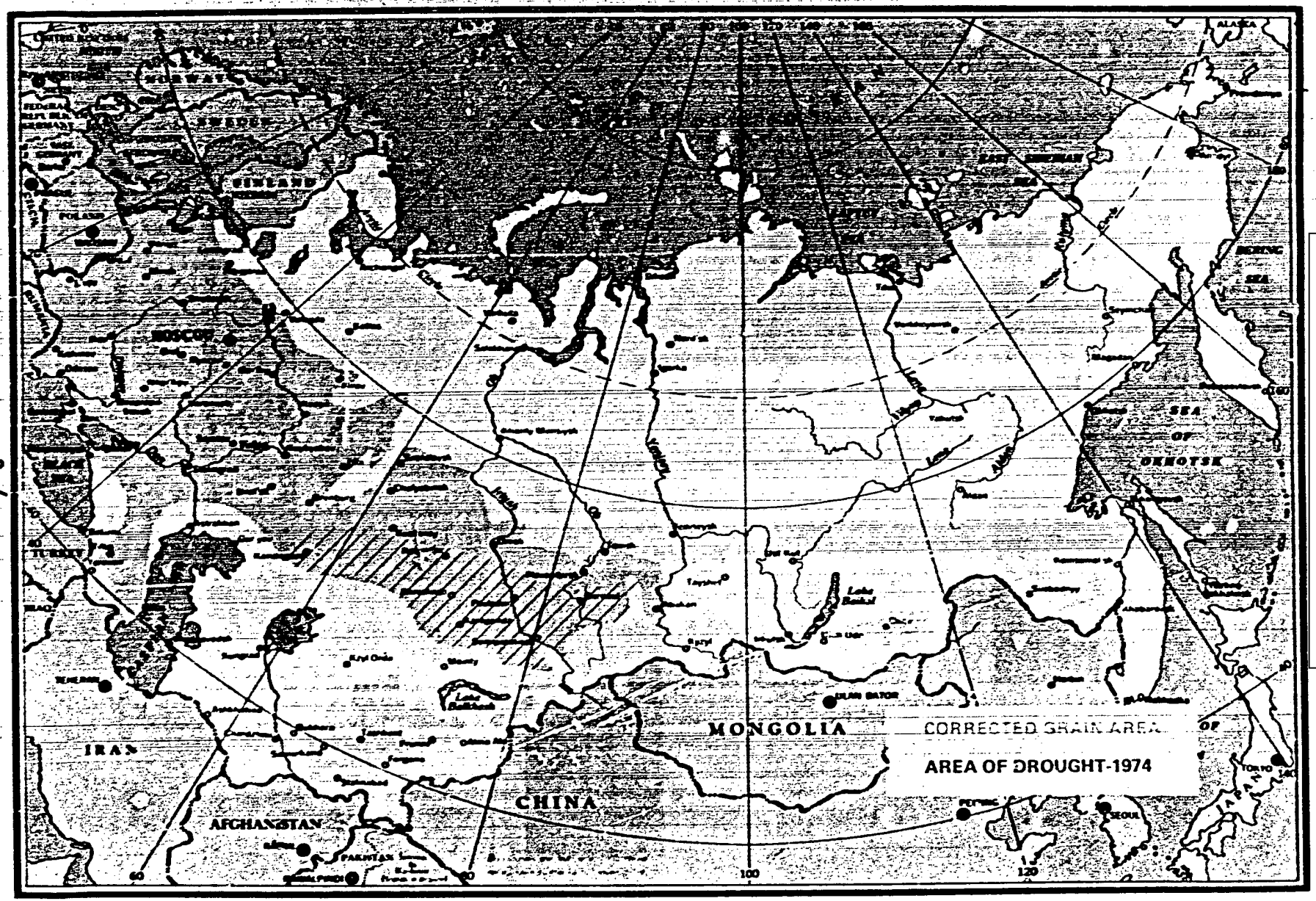

FIGURE 1. USSR WHEAT PRODUCING AREAS

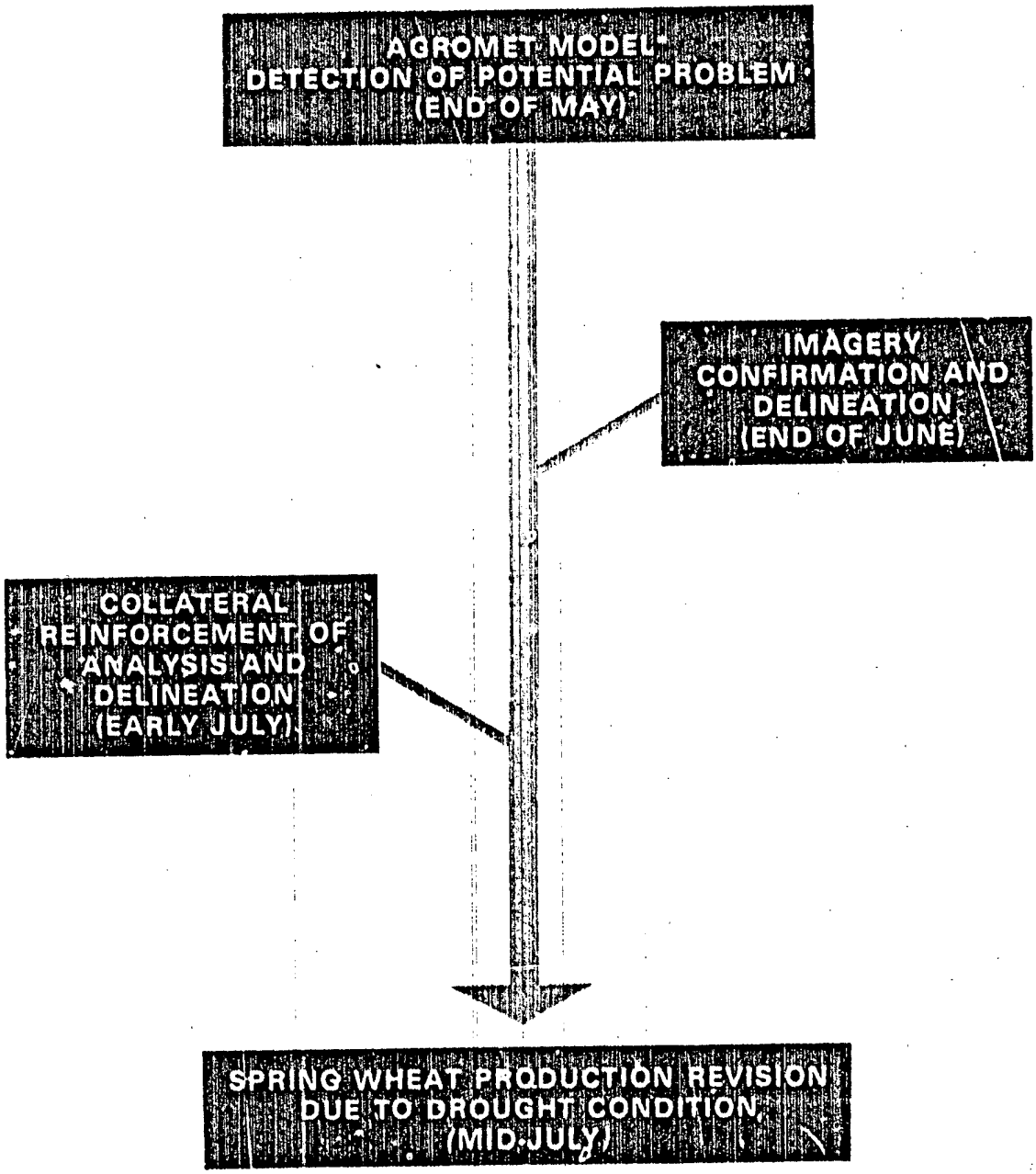

FIGURE 2. CONVERGENCE OF EVIDENCE OF DROUGHT SITUATION